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## Flower Visitation of *Bombus haematurus* KRIECHBAUMER 1870 (Hymenoptera, Apidae) in Graz, Styria

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**Abstract:** *Bombus haematurus* KRIECHBAUMER 1870, reported for Austria in 1995 for the first time, was discovered in Graz, Styria, in 2005. A wide spectrum of flowers (not only bee-blossoms) was visited in the greenhouse of the Botanic Garden. 2006 and 2009 workers appeared in the open of the garden using vibratory pollen-collection on *Papaver*, *Meconopsis* and *Symphytum* flowers.

**Key words:** Apidae, *Bombus haematurus*, distribution, floral ecology, Styria.

### Dedication

This paper is dedicated to Univ.-Prof. Dr. Hans Malicky on the occasion of his 75<sup>th</sup> birthday.

Hans Malicky and the author have known one another since the begin of the 60s from the meetings of the "Arbeitsgemeinschaft österreichischer Entomologen" in Vienna. Later, in the 70s and 80s H. Malicky supported my karyological and systematic work on *Onosma* (Boraginaceae) substantially by collecting herbarium specimens and fixations on his field trips to Greece and adjacent countries. I acknowledged his help by dedicating the two taxa *Onosma erecta* subsp. *malickyi* and *O. malkarmayorum* (TEPPNER 1988, 2008). Furthermore, H. Malicky enriched the plant collection of the Botanic Garden in Graz by donating seeds and fruits. The most apparent plants still alive are a large tree of *Manglietia garrettii* (flowering 2009 for the first time; investigated by SCHUEHL & al. 2010) and a gigantic bean liana (*Mucuna macrocarpa*).

Many thanks!

Ad multos annos!

### Introduction

*Bombus haematurus* KRIECHBAUMER 1870 (subgenus *Pyrobombus*) can easily be recognized by the very large yellow, transversal band (consisting of bands on two adjacent segments) on the abdomen of queens and worker bees; the thorax ports a yellow band in the anterior part of the thorax, like in *Bombus hortorum* [e.g., NEUMAYER (2004); Fig. 1]. In the last decennia this Eastern Mediterranean bumblebee [e.g. ANAGNOSTOPOULOS (2005)] was extending its area toward North and Northwest and reached Hungary [first

records from the beginning of the 80s, see for e.g., SÁROSPATAKI et al. (2005)] and Austria [first report 1995 from Bad Gleichenberg, S. E. Styria: JOZÁN (1995)]. The second record for Austria was reported from Güssing, Southern Burgenland, dating from 2002 (NEUMAYER 2004). The intention of this paper is to communicate flower visitation of *B. haematurus* at an actual margin of the distribution area in Graz.

## Material and Methods

The observation site is the Botanic Garden of the Institute for Plant Sciences at the University of Graz in Styria (Austria), 47°5' N, 15°27' E, altitude c. 380 m. In 2005 the studies were undertaken in a part of the greenhouse for plants of temperate climates (divisions for succulents, for Andean plants and a division with mainly cycads); in this part artificial nest enclosures for bumblebees were at disposition. The search for *B. haematurus* in the open of the garden was successful in 2006 and 2009. In all years, on many days with good weather conditions a set of flowers usually visited by bumblebees was checked, often more than once the day.

## Results

### Occurrence in Styria

On April 11, 2005, a queen of *Bombus haematurus* appeared in the greenhouse. This was the second record in Styria. It was possible to place the bee in an artificial nest enclosure which was accepted immediately. Until June the bee was often observed collecting pollen and nectar in the greenhouse. However, the development of a colony was not successful, two workers were probable but not sufficiently confirmed, the only sure result was a male. On July 2, the nest was empty, it consisted of two nectar pots only and no brood, thus the male was captured as voucher specimen. The reasons for the failure may lie in prolonged open doors leading to the absence of the queen from the nest for few days and in poisonous nectar from *Inga* [non-protein amino acids and alkaloids (GUERRANT & FIEDLER 1981)] and *Nicotiana* (nicotine) flowers.

In 2006 a colony must have been present in the vicinity of the garden, because from May 23 until June 3, workers were observed regularly in the garden (often up to three individuals at the same time). After a period with very cool and rainy weather (until June 11), no further observations were made.

In 2007 and 2008 *B. haematurus* was not seen. In 2009, once again, this bumblebee visited flowers in the botanic garden and workers were observed from May 18, until June 2, 2009 (on one day also three individuals at the same time).

Although frequently controled, *B. haematurus* was never seen in the vicinity of the garden nor in other parts of the city.

In August 2006 J. Neumayer informed me that *B. haematurus* was observed 2006 near Gosdorf in southeasternmost Styria (c. 48 km in the S. E. of Graz) and that photos taken by A. Stiasny are accessible at <[www.wildbienen.de/b-haemat.htm](http://www.wildbienen.de/b-haemat.htm)>. This is the third record for Styria. The bumblebee was discovered by Eberhard von Hagen during one of

his stays at the Hummelbauernhof ['bumblebee farm'] of Franz Schmidlechner in Müsselsdorf near Gosdorf. Since then, *B. haematurus* was present there in all years in artificial nest enclosures (oral communication by Franz Schmidlechner). Since the discovery of the bee near Bad Gleichenberg in 1995 up to 2006 it was not seen in this region, apparently.

A fourth record was reported from the surroundings of Weiz in E. Styria in 2008 (Neumayer in litt.).

### Flower Visitation in the Greenhouse

From mid April to end of June 2005 flower visitation could be observed on many days mainly in the divisions for succulents and Andean plants. The main pollen and nectar sources were:

*Nicotiana otophora* (Solanaceae) (nectar and pollen collected separately because of the large distance between nectar source and anthers)

*Nolana humifusa* (Nolanaceae) (pollen and nectar, Fig. 1, above right)

*Bulbine caulescens* (Asphodelaceae) (pollen-only blossoms with a tuft of hairs on the filaments, simulating a larger quantity of pollen, Fig. 1, below left)

*Aloe barbadensis* (Aloeaceae) (nectar, Fig. 1, above left)

*Inga feuillei* (Mimosaceae) [floral nectar, large polyads not collected by bees, extrafloral nectar (TEPPNER & STABENTHEINER 2006)]

*Pittosporum tobira* (Pittosporaceae) (apparently nectar, no details seen)

In *Bulbine caulescens* and *Nolana humifusa* pollen was sampled by vibratory pollen-collection [for the term and a summary about the mechanism see TEPPNER (2005)].

The following species were also visited but were apparently of minor importance (because of the presence of few flowers or scarce visits):

*Bougainvillea* sp. (Nyctaginaceae)

*Trixis californica* (Asteraceae)

*Onoseris albicans* (Asteraceae)

*Pereskia grandiflora* (Cactaceae)

*Prunus capollin* (Rosaceae)

*Eliocarmos thyrsoides* (Hyacinthaceae)

The spectrum of flowers visited is very wide and encompasses not only bee-blossoms but also ornithophilous (*Aloe barbadensis*) and chiropterophilous (*Nicotiana otophora*) blossoms as well as moth- or butterfly-blossoms (*Inga feuillei*, *Pittosporum tobira*, *Bougainvillea*), if pollen and/or nectar are accessible for the bees in a sufficient way.

### Flower Visitation in the Field

One worker of *B. haematurus* in Austria was collected from *Phacelia tanacetifolia* (Hydrophyllaceae) (NEUMAYER 2004) and the first photos on the website cited above, show also *Ph. tanacetifolia* and *Lamium maculatum* as well. According to F. Schmidlechner most of the flowers visited by bumblebees in the surroundings of his artificial nest enclosures are also visited by *B. haematurus* (oral comm.).

In contrast, the number of visited flower types was very small in the open in the Botanic Garden in Graz. High attractiveness showed the pollen-only blossoms of Papaveraceae, namely *Papaver pseudo-orientale* (Fig. 1, below right) and *Meconopsis cambrica*, both were exploited by vibratory pollen-collection in the second half of May. On *P. orientale* and *P. bracteatum*, which are flowering only a short time later in other parts of the garden, *B. haematurus* has never been seen. At the end of May and begin of June this bumblebee visited *Symphytum officinale* and *S. ×uplandicum* (Boraginaceae) whose tubular flowers offer pollen and nectar. In these flowers of the streukegel-blossom type the pollen is held by the cone formed by the connivent anthers and the coronal scales, so vibratory pollen-collection is appropriate once more. The nectar is sucked simultaneously during the same visit. No nectar-robbing occurred. Until now, no visits on other plant species have been observed in this garden.

### Discussion

At present *Bombus haematurus* is in Styria at the margin of its distribution area. Since 2006, it was found continuously in southeastern Styria inhabiting artificial nest enclosures. Because of the sporadic observations in Graz, the species seems not to be fully established here. Whether the artificial nest enclosures support the establishment of stabile populations and the dispersal remains an open question. Thus, intensive research would be necessary to clarify the status of this bumblebee in different parts of our country. Surprising is the low number of plant species visited in the open of the garden, especially the fact that for a relatively long time span besides the visits of pollen-only flowers no visits on nectar-sources were seen. Such visits must occur outside the garden, but it was not possible to observe these visits until now. In contrast, a wide spectrum of flowers was visited in the greenhouse, not only bee-blossoms but also other blossom types. This is also well known from other bumble bee-species, of which we hosted colonies in the greenhouse in the last decennium (*B. terrestris*, *B. hortorum*, *B. lapidarius*, *B. pascuorum*).

### Acknowledgements

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### Zusammenfassung

Blütenbesuch von *Bombus haematurus* (Hymenoptera, Apidae) in Graz, Steiermark.

*Bombus haematurus*, der 1995 erstmals in Österreich nachgewiesen wurde, ist in Graz, Steiermark, 2005 entdeckt worden. Im Gewächshaus des Botanischen Gartens wurde ein breites Spektrum verschiedener Blüten (nicht nur Immenblumen) besucht. 2006 und 2009 erschienen Arbeiterinnen im Freiland des Botanischen Gartens und beuteten *Papaver*-, *Meconopsis*- und *Symphytum*-Blüten durch Vibrationssammeln auf Pollen aus.

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**Fig. 1:** *Bombus haematurus* on flowers in the greenhouse (♀, above and below left) and in the open (♂, below right). Nectar sucking above left, otherwise vibratory pollen-collection. Above left: *Aloe barbadensis*; above right: *Nolana humifusa*, flower at the begin of anthesis; below left: *Bulbine caulescens*; below right: *Papaver pseudo-orientale*, pollen packing into the corbiculae interrupts the vibratory pollen-collection.